

ON THE REMAINS OF CARNIVORA FROM CAVE
DEPOSITS IN JAVA AND SUMATRA, WITH NOTES
ON RECENT SPECIMENS. I

by

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With Plate IV and 1 textfigure

The purpose of these notes is to describe and figure the remains of Carnivora collected from cave deposits by Prof. Dr. Eug. Dubois during his paleontological searches in Java and Sumatra (1888—1895). For comparison with these prehistoric remains recent Carnivora from the Malay Archipelago and from the Asiatic mainland were examined, and notes on these are included. In the present paper remains of a marten (*Martes (Charronia) flavigula* (Bodd.) subsp.) from Goea (= cave) Djimbe, and those of a dog (*Canis familiaris* L.) from Goea låwå, both in Central Java, are described, together with some notes on recent Mustelidae.

The materials used for comparison form part of the collections of the Rijksmuseum van Natuurlijke Historie, Leiden, the Zoölogisch Museum Amsterdam, the British Museum (Natural History), London, the Naturhistorische Museum, Berne, and of the collection of Mr. H. J. V. Sody. For the permission to examine specimens under their care, as well as for the loan of specimens, I am indebted to Prof. Dr. F. Baumann, Berne; Prof. Dr. L. F. de Beaufort, Amsterdam; Mr. A. C. V. van Bemmel, at that time in Amsterdam; Mr. R. W. Hayman, London; Mr. M. A. C. Hinton, London; Dr. W. Küenzi, Berne; Mr. R. I. Pocock, London, and Mr. H. J. V. Sody, at that time in Amsterdam. My thanks are due to Mr. M. A. Koekkoek for the drawings, and to Mr. H. Cornet for the photographs.

MUSTELIDAE

No unanimity exists as to the number of subfamilies and genera to be recognized in the Mustelidae, and the nomenclature of several genera is rather confused. In a number of papers, Pocock (1918; 1921 a; 1921 b) discussed the characters of the recent forms. The great value of his

researches lies in the information given about characters, which up to that time had received little or no attention. However, Pocock goes very far in the splitting up of the genera, and in this I cannot follow him. Pilgrim (1933) discussed the classification of the Mustelidae with special reference to extinct genera. A definite conclusion as to the number of valid subfamilies, genera and subgenera of Mustelidae can only be reached by a reviser, who makes a complete survey of all the species involved, both living and extinct. As I do not possess the necessary materials for such a revision, I must limit my notes to the few forms studied by myself.

Some difficulties were encountered with regard to the use of the generic name *Mustela* L., 1758. Several authors have designated the type species for this genus, but unhappily three different species are involved. These different type designations may be briefly discussed.

Blainville (1841, p. 2) mentions that he takes *Mustela foina* as the type of the genus *Mustela*. Besides that this species was not mentioned by Linnaeus in 1758 among the species of his genus *Mustela*, the word "type" as used by Blainville indicates an example for the osteological description of the species of this group, rather than a type in the nomenclatorial sense.

When dealing with the genus *Mustela*, Chenu & Desmarest (no date, probably published in 1853 or prior to that year, p. 259) wrote concerning the name *Mustela*: "Nom appliqué anciennement à la Marte, espèce typique du groupe générique." Among the species included in this genus they mention on p. 263: "MARTE. *MUSTELA MARTES*. Linné." In all probability the authors meant that *Mustela martes* was a species typical for the genus, and not the type of the genus in the nomenclatorial sense. Therefore, it is best to neglect this very doubtful type designation, and to consider that by Coues (1877, p. 60) as the earliest valid designation. Coues (l.c.) wrote: "According to Gerrard, the vertebrae of *M. martes*, type of the genus, is....." This same species (*Mustela martes* L., 1758) is mentioned as the type species of the genus *Mustela* L. by several other authors, e.g., Miller & Rehn (1901, p. 226), Palmer (1904, p. 436), Elliot (1905, p. 419), Birula (1910, p. 323). This type designation is also in accordance with the subdivision of the genus *Mustela* by G. Cuvier (1817, pp. 142—149).

So far no serious difficulties are encountered, for the fact that Pinel (1792, p. 55 footnote) introduced the name *Martes* for a genus of which *Martes domestica* Pinel (= *Martes* (*Martes*) *foina* (Schreb.)) is the type by monotypy, does not invalidate the type designation by Coues. However, two other authors have designated other species as the type of the genus *Mustela* L., and one of these type designations has been generally accepted in recent literature.

Elliot (1901, p. 333) mentions *Mustela lutra* L. as the type of the genus *Mustela* L., 1766. Obviously this is a lapsus, for on p. 352 of the same paper Elliot mentions *Mustela lutra* L. as the type of the genus *Lutra* Erxl. as well. For this reason, and for the earlier type designation by Coues, that by Elliot may be neglected.

Thomas (1911, p. 138) designated *Mustela erminea* L., 1758, as the type by tautonymy of the genus *Mustela* L., 1758. In this he was followed by Miller (1912 a, p. 381; 1912 b, p. 95; 1924, p. 116), by Cabrera (1932, p. 141) and by Hall (1936, p. 91). It is this type designation that is generally accepted in recent literature, in which the genus *Mustela* L. is restricted to the stoats and weasels, while the martens are referred to the genus *Martes* Pinel, and in which the polecats are placed in the genus *Putorius*.

An extensive, though by no means complete survey of mammalogical literature shows that in recent publications the majority of authors use *Martes* Pinel for the martens, although even in some recent publications (e.g., Perrier & Perrier, 1932, p. 3560) *Mustela* is still used in this sense. It is clear that a strict application of the International Rules of Zoological Nomenclature, which in this case would invalidate the type designation by Thomas (1911) in favour of that by Coues (1877) would create greater confusion than uniformity. The strict application of the Rules would mean that the name *Martes* Pinel, 1792, at present used for the martens by the majority of mammalogists must be replaced again by the name *Mustela* L., 1758, which at present is in common use for the stoats (and weasels). It is, therefore, proposed that the International Commission on Zoological Nomenclature may consider this case, and it is hoped that the Commission may see it fit to render an opinion in which *Mustela erminea* L., 1758, is accepted as the type species of the genus *Mustela* L., 1758, thus suppressing the type designation by Coues (1877)¹). Pending this question I adhere to using *Martes* for the martens, *Mustela* for the stoats, weasels and allied forms.

***Martes (Charronia) flavigula flavigula* (Bodd.)²**

The White-cheeked Weasel, Pennant, Quadr., vol. 2, 1781, p. 331, and 3rd ed., vol. 2, 1792, p. 52 (non vidi).

1) Apstein (1915, p. 200) includes *Mustela* L., type *martes* L. in the list of proposed nomina conservanda. Acceptance of *Mustela* in this sense as a nomen conservandum would only create confusion, as shown above.

2) The manuscript name *Mustela ellottii*, which Gray (1865, p. 109) includes in the synonymy of *Martes flavigula*, probably is a synonym of *Martes (Charronia) gwatkinsii* Horsf. (cf. Blyth, Journ. As. Soc. Beng., vol. 26, no. 4, 1857, p. 316; *Martes flavigula*, race no. 4, M. Elliot's animal).

Mustela flavigula Boddaert, Elench. Anim., 1785, p. 88; Desmarest, Mammalogie, vol. 1, 1822, p. 185 footnote (sousgenre *Martes*); Lesson, Manuel Mammal., 1827, p. 150; [Bennett], Gardens Menagerie Zool. Soc., 1830, p. 225, fig.; Shore, Zool. Journ., vol. 5, 1830, p. 271, suppl. pl. 44; Hodgson, Proc. Zool. Soc. Lond., 1834, p. 97; Lesson, Hist. nat. gén. part. Mammif. Oiseaux, vol. 5, 1836, p. 302; Waterhouse, Cat. Mamm. Mus. Zool. Soc. Lond., 2nd ed., 1838, p. 34; Wagner, Abh. mathem. phys. Cl. Bayer. Akad. Wiss., vol. 4 (Denkschr., vol. 19), pt. 2, 1845, pp. 81, 93 (reprint, pp. 191, 203) (part.); Schinz, Volledige Nat. Hist. Zoogd., 1845, p. 167; Brandt, Mém. Ac. Sc. St. Pétersb., ser. 6, sc. mathém. phys. nat., vol. 8, 1856, p. 193 (part.); Murray, Geogr. Distr. Mamm., 1866, pp. 385, 388; Martin, Säugeth., Illustr. Naturg. Thiere, vol. 1, pt. 1, 1882, p. 274 (part.); Blanford, Mammalia, pt. 1, Fauna Brit. Ind., 1888, pp. XIV, 158 (part.), fig. 39; Sclater, Cat. Mamm. Ind. Mus., pt. 2, 1891, p. 273 (part.); Pechuel-Loesche, Brehms Tierl., 3rd ed., Säuget., vol. 1, 1893, p. 601 (part.); Trouessart, Cat. Mamm., vol. 1, pts. 1—3, 1897, p. 271 (part.); Haacke & Kuhnert, Tierl. d. Erde, vol. 2, 1901, p. 250 (part.); Koningsberger, Zoogd. Java, Meded. Lands Plantent., no. 54, 1902, p. 22 (part.), pl. I fig. 8; Dagliesh, Journ. Bombay Nat. Hist. Soc., vol. 17, 1906, p. 123; Ward, ibid., vol. 17, 1907, p. 929; Millard, ibid., vol. 20, pp. 255, 536; Trouessart & Kollman, Bull. Mus. nat. Hist. Nat., Paris, vol. 19, 1913, p. 418; Lydekker, Wild Life of the World, vol. 2, ± 1915, pp. 53, 144 (part.); Anon., Journ. Bombay Nat. Hist. Soc., vol. 27, 1921, p. 971.

M[ustela] flavigula, W. H. Flower & Lydekker, Introd. Study Mamm. living extinct, 1891, p. 584 (part.); Lydekker, Royal Nat. Hist., vol. 2, 1894, p. 57 (part.), and new ed., vol. 2, n.d., p. 57 (part.); Heck, Säuget., in: Hausschatz d. Wissens, Abt. VI, vol. 9, Das Tierreich, vol. 2, 1897, p. 1146 (part.); Littledalf, Journ. Bombay Nat. Hist. Soc., vol. 11, 1898, p. 497; Ménégaux, Mammif., n.d., p. 476.

Mustella flavigula, Millard, Journ. Bombay Nat. Hist. Soc., vol. 18, 1907, p. 218.

Pustela flavigula, Millard, Journ. Bombay Nat. Hist. Soc., vol. 17, 1907, p. 1040.

Mustela flavigula, Fulton, Journ. Bombay Nat. Hist. Soc., vol. 14, 1903, p. 759.

Mustela [(Mustela)] flavigula, Cantor, Journ. As. Soc. Beng., vol. 15 (no. 171; n.s., no. 87), 1846, p. 194 (part.); Chemu & Desmarest, Carnassiers, pt. 1, ± 1853, p. 273; W. H. Flower & Garson, Cat. Specim. Osteol. Dent. Vertebr. Anim. Mus. Roy. Coll. Surg. Engl., pt. 2, 1884, p. 137 (part.).

Mustela (Mustela) flavigula, Trouessart, Cat. Mamm., Suppl., pts. 1—2, 1904, p. 203.

M[ustela] [(Martes)] flavigula, Fischer, Synops. Mamm., 1829, p. 218; Wagner, in: Schreber, Säugeth., Suppl. vol. 2, 1841, p. 224 (part.); Giebel, Säugeth., 1855, p. 774 (part.), and 2nd ed., 1859, p. 774 (part.).

Must[ela] [(Martes)] flavigula, Schinz, Synops. Mamm., vol. 1, 1844, p. 335 (part.).

Mustela (Martes) flavigula, Westerman, Bijdr. Dierk., vol. 1, 1851, Zool., (pt. 3), p. 13.

Mustela [(Martes)] flavigula, Reichenbach, Prakt. Naturg. Mensch. Säugeth., new ed., 1855, p. 229 (part.).

Martes flavigula, Hodgson, Journ. As. Soc. Beng., vol. 10, pt. 2 (no. 119; n.s., no. 35), 1841, p. 909; Hodgson, ibid., vol. 11 (no. 124; n.s., no. 40), 1842, p. 281 (*Martes* considered to be a subgenus, but no generic name mentioned); Gray, Cat. Specim. Draw. Mamm. Nepal Thibet Brit. Mus., 1846, p. 12; Gray, List Osteol. Specim. Brit. Mus., 1847, pp. X, 18; Gray, Zool. Voy. Samarang, Vertebr. I, Mamm., 1850, p. 17 (part.); Horsfield, Cat. Mamm. Mus. Hon. E. Ind. Comp., 1851, p. 98 (part.); Blyth, Proc. As. Soc. June 1857, in: Journ. As. Soc. Beng., n.s., vol. 26, no. 4 (no. 88), 1857, p. 316 (race no. 1); Adams, Proc. Zool. Soc. Lond., 1858, p. 516; Gray & Gerrard, Cat. Bones Mamm. Brit. Mus., 1862, p. 91; Blyth, Proc. Zool. Soc. Lond., 1864, p. 485; Murray, Geogr. Distr. Mamm., 1866, p. 328 (part.), p. 387; Jerdon, Mamm. India, 1867, p. 82 (non vidi), and re-impre-

sion, 1874, p. 82 (part.); Blyth, Journ. As. Soc. Beng., n.s., vol. 44 (on cover: 43), pt. 2, extra number, no. 1, 1875, p. 29; Sterndale, Mamm. India Ceylon, 1884, p. 141; Brehm, Thierl., 2nd. ed., Säugeth., vol. 2, 1886, p. 69 (part.); Kinnear, Journ. Bombay Nat. Hist. Soc., vol. 20, 1911, p. 1184; Magrath, ibid., vol. 21, 1912, p. 1320; Secretary, ibid., vol. 22, 1913, p. 214; Dodsworth, ibid., vol. 22, 1914, p. 736; Wroughton, ibid., vol. 23, 1914, p. 293; Secretary, ibid., vol. 23, 1914, p. 384; Hilzheimer, in: Brehms Tierl., 4th ed., vol. 12 (Säuget., vol. 3), 1915, pp. XIII, 309 (2nd re-impres. 1920, pp. XI, 309) (part.); Wroughton, Journ. Bombay Nat. Hist. Soc., vol. 24, 1916, pp. 301, 485, 767; Stevens, in: Wroughton, ibid., vol. 24, 1916, p. 775; Muir, ibid., vol. 24, 1916, p. 589; Secretary, ibid., vol. 24, 1916, pp. 618, 849, 851; Wroughton, ibid., vol. 25, 1917, pp. 69, 277; Inglis, Travers, O'Donel & Shebbeare, ibid., vol. 26, 1919, p. 823; Anon., ibid., vol. 27, 1920, pp. 186, 411; Wroughton, ibid., vol. 27, 1921, p. 527; S. S. Flower, Mammals, in: List Vertebr. Anim. Gard. Zool. Soc. Lond., centenary ed., vol. 1, 1929, p. 135 (part.).

Martes flavigula flavigula, Wroughton, Journ. Bombay Nat. Hist. Soc., vol. 26, 1919, p. 343; Wroughton, ibid., vol. 27, 1921, p. 527.

Martes flavigula var. A, Blyth, Cat. Mamm. Mus. As. Soc., 1863, p. 67.

Mustela flavigula typica, Bonhote, Ann. Mag. Nat. Hist., ser. 7, vol. 7, 1901, pp. 343, 344.

Martes (Charronia) flavigula, Gray, Proc. Zool. Soc. Lond., 1865, p. 108; Gray, Cat. Carniv. Pachyd. Edent. Mamm. Brit. Mus., 1869, p. 86.

Charronia flavigula, Pocock, Ann. Mag. Nat. Hist., ser. 9, vol. 1, 1918, p. 310 (part.); Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 10, 1922, p. 395; Hinton & Fry, Journ. Bombay Nat. Hist. Soc., vol. 29, 1923, p. 414; Mills, ibid., vol. 29, 1923, p. 225; Hinton & Lindsay, vol. 31, 1926, p. 393; Ward, ibid., vol. 33, 1928, p. 65; Ali, ibid., vol. 37, 1935, p. 819 (part.).

Charronia flavigula flavigula, Allen, Amer. Mus. Novit., no. 358, 1929, p. 1; Allen, Mamm. China Mongolia, Nat. Hist. Centr. Asia, vol. 11, pt. 1, 1938, p. 363.

Charionia flavigula, Thom, Journ. Bombay Nat. Hist. Soc., vol. 39, 1937, p. 317.

Lamprogale flavigula flavigula, Pocock, Proc. Zool. Soc. Lond., 1936, p. 532, figs. 1 J, 2 C—D.

Mustela melina Kerr, Anim. Kingd., 1792, p. 183.

Viverra quadricolor Shaw, Gen. Zool., Mamm., vol. 1, pt. 2, 1800, p. 429.

Mustela quadricolus, Chenu & Desmarest, Carnassiers, pt. 1, ± 1853, p. 273 (in synonymy).

Mustela leucotis Bechstein, Übers. vierf. Thiere, vol. 2, 1800, p. 375 (non vidi) (not *M[ustela] [(Martes)] leucotis* Hamilton Smith, 1827).

Mustela hardwickii Horsfield, Zool. Journ., vol. 4, 1828, p. 239, pl. VIII; Horsfield, Isis, 1830, p. 1258; Horsfield, Bull. Sc. nat. géol. (2nd sect. Bull. univ.), vol. 20, 1830, p. 322 (review by K[uhn]); Hodgson, Journ. As. Soc. Beng., vol. 1, no. 8, 1832, p. 341; Lesson, Hist. nat. gén. part. Mammif. Oiseaux, vol. 5, 1836, p. 301; Müller, Zoogd. Ind. Arch., Verh. Nat. Gesch. Ned. Overz. Bez., 1839, p. 30 (part.); Schlegel, Handl. Dierk., vol. 1, 1857, p. 33; Jentink, Cat. Ost. Mammif., Mus. Hist. Nat. Pays-Bas, vol. 9 (bis), 1887, p. 112; Jentink, Cat. Syst. Mammif., Singes Carniv. etc., Mus. Hist. Nat. Pays-Bas, vol. 11, 1892, p. 140.

Putorius hardwickii [= *Mustela (Putorius) hardwickii*], Boitard, Dict. univ. Hist. Nat., vol. 8, 1846 (titlepage), 1847 (cover), p. 12; Boitard, ibid., 2nd ed., vol. 8, 1868, p. 581.

M[artes] hardwickii, Hamilton Smith Introd. Mamm., Naturalist's Libr., vol. 15, 1858, p. 187 (part.).

M[ustela] hardwickii, Pechuel-Loesche, Brehms Tierl., 3rd ed., Säuget., vol. 1, (new re-impres.), 1893, p. 601 (in synonymy).

Mustela flavigula Var. 1 *Mustela hardwickei*, Grevé, Nova Acta Ac. Leop. Carol., vol. 63, 1894, pp. 180, 214, pl. XVII (part.).

Mustela henrici Schinz, Synops. Mamm., Nachtr., 1845, p. 36.

Mustela flavigula Var. 2 *Mustela henrici*, Grevé, Nova Acta Ac. Leop. Carol., vol. 63, 1894, pp. 180, 214, tab. XVII (part.).

Galidictis chrysogaster Hamilton Smith, Mamm., vol. 1, Naturalist's Libr., vol. 15, 1842, p. 167, pl. 7 (non vidi); Hamilton Smith, Introd. Mamm., Naturalist's Libr., vol. 15, 1858, p. 167, pl. 7.

Martes gwatkinsi, Horsfield, Cat. Mamm. Hon. E. Ind. Comp., 1851, p. 99 (part.).

Mustela flavigula kuatunensis Bonhote, Ann. Mag. Nat. Hist., ser. 7, vol. 7, 1901, pp. 341, 348.

Charronia flavigula kuatunensis, Cabrera, Bol. Real Soc. Esp. Soc. Hist. Nat., vol. 22, 1922, p. 164; Howell, Proc. U. S. Nat. Mus., vol. 75, art. 1, 1929, p. 25.

Martes flavigula borealis, Thomas, Proc. Zool. Soc. Lond., 1908 (1909), p. 967 (part.); Allen, Mem. Mus. Comp. Zoöl., vol. 40, no. 4, 1912, p. 238; Sowerby, in: Clark & Sowerby, Through Shén-Kan, 1912, p. 174.

Mustela flavigula borealis, Jacobi, Abh. Ber. Mus. Tierk. Völkerk. Dresden, vol. 16, no. 1, 1923, p. 4 (part.).

Charronia flavigula borealis, Howell, Proc. U. S. Nat. Mus., vol. 75, art. 1, 1929, p. 24 (part.).

Mustela flavigula szetchunensis Hilzheimer, Zool. Anz., vol. 35, 1910, p. 310.

Charronia melli Matschie, Arch. Naturg., vol. 88, sect. A, pt. 10, 1922, pp. 17, 34 (non vidi).

Charronia yuenshanensis Shih, Bull. Dept. Biol. Sun Yatsen Univ., no. 9, 1930, p. 3. The yellow-necked marten, Hodgson, Journ. As. Soc. Beng., no. 67 (vol. 6, pt. 2), 1837, p. 560 (referred to the subgenus *Martes*).

Specimens examined:

1 ex., "Bengal", Frank, mounted skin (cat. syst.: a), skull (cat. ost.: a).

1 ex., ♂, "Continent de l'Inde", purchased in London, 1834, mounted skin (cat. syst.: b), skull (cat. ost.: b).

1 ex., "Bengale", Frank, mounted skin (cat. syst.: c), skull (cat. ost.: c).

1 ex., "Baie de Portland", mounted skin (cat. syst.: d).

1 ex., Bari (village in the mountains near the Sutlej river, about two day marches from Sarahan), Bashar, Hill States, British India, leg. Dr. W. G. N. van der Sleen, 1926, Zoölogisch Museum, Amsterdam, skin and skull.

1 ex., ♂, Wassu Mts., Szechwan, leg. Dr. Weigold, skin only.

1 ex., ♀, Taukwan, Szechwan, leg. Dr. Weigold, skin only.

The four mounted skins in the Leiden Museum are those mentioned by Jentink (1892, p. 140) under *Mustela hardwickii*. The locality records are rather vague and probably more or less incorrect. The two skins from Szechwan are those recorded under *Mustela flavigula borealis* by Jacobi (1923, p. 4).

The four mounted skins closely resemble the specimen figured by Horsfield (1828, pl. VIII). The specimen from Bari in the Amsterdam Museum differs markedly from the mounted skins. In this specimen the head is blackish brown (closest to bone brown of Ridgway) above, and this colour continues as two black streaks on the sides of the neck. The hairs

TABLE I. Measurements in mm

	sex	condylobasal length	greatest length	prosthion-staphylylion	staphylylion-basion	breadth of rostrum	interorbital breadth	postorbital breadth	mastoid breadth	zygomatic breadth	breadth across the incisivi	C—M ¹		P ¹ —M ¹	
												r	l	r	l
<i>Martes (Charronia) flavigula flavigula</i>															
cat. ost.: b	♂	102.7	104.0	46.8	48.4	23.9	23.4	25.2	45.2	—	11.0	33.4	32.8	27.4	—
cat. ost.: a	—	100.0	101.7	46.4	45.7	21.6	23.8	22.8	44.6	59.8	10.7	31.5	31.9	25.9	25.9
Mus. Amsterdam	—	94.3	95.1	43.2	45.5	19.2	19.8	22.7	40.1	—	11.2	30.2	30.3	23.1	23.1
cat. ost.: c	—	—	91.6	41.7	—	19.1	18.4	22.0	39.8	48.9	9.8	29.5	28.8	21.6	—
<i>Martes (Charronia) flavigula lasiotis</i>															
Sumatra, Padang	♂	—	—	40.8	—	—	21.0	20.4	40.8	58.6	10.3	29.6	—	—	24.1
Sumatra, Mt. Talamau . . .	♂	94.4	94.3	42.5	45.0	20.0	19.6	20.5	39.5	51.3	11.1	29.3	29.3	24.7	24.5
Sumatra, leg. Westenenk . .	—	87.4	90.2	40.8	41.0	18.3	19.7	22.0	37.7	50.6	10.0	28.3	28.2	—	23.6
Sumatra, Lampung distr. .	♀	83.9	84.9	39.0	39.5	17.3	18.2	22.2	37.6	—	9.6	27.0	26.9	22.4	22.3
Banka	—	87.3	86.7	41.0	40.5	17.8	—	—	37.8	50.8	9.9	27.6	27.6	22.8	22.8
Borneo, leg. Diard	—	87.2	87.9	40.0	41.5	19.3	19.7	19.8	39.0	55.5	10.0	28.4	28.2	22.8	—
Borneo, Pleyharie	♂	90.0	91.0	39.5	43.2	20.5	19.3	19.4	39.5	—	10.4	27.8	27.8	22.5	—
Borneo, leg. Hose.	—	—	—	38.4	—	19.0	16.5	21.7	—	47.6	10.4	26.6	26.5	—	22.1
Java, leg. Müller	♀	96.9	97.9	45.3	44.6	20.6	19.8	—	43.5	56.8	11.3	31.9	31.6	26.4	26.0
Java, leg. Büttikofer	♀	—	93.7	41.0	—	28.7	19.0	23.5	—	51.1	10.4	30.6	31.0	—	—

on the middle of the neck have black bases and golden tips, giving the whole a golden tinge. The shoulders are much lighter than either the head or the hindquarters; they too have a distinct golden tinge. Anteriorly the back is buffish at the sides, the colour becoming darker posteriorly. The hindquarters and the tail are black. The chin is white, except for a blackish spot at the symphysis. A small black spot in the white behind the right corner of the mouth, and another elongated black spot in the middle of the throat at the level of the ears. The throat is slightly yellowish (approaching maize yellow of Ridgway). The hairs on the sides of the neck, below the black streaks, with a golden tinge. Lower surface greyish-brownish. Feet black. The golden tinge of the neck and shoulders are still more evident in the male skin from Szechwan. This specimen is lighter in

C	P ¹	P ²				P ³				P ⁴								M ¹							
		length		length		breadth		length		breadth		length		breadth		length of inner lobe		width of trenchant part		lateral length		mesial length		breadth	
		r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l
5.6	5.5	—	—	—	4.4	—	2.5	6.3	6.1	3.2	3.2	10.4	10.5	6.7	6.8	2.8	2.8	3.8	3.9	4.7	4.7	4.8	4.7	9.7	9.7
5.7	5.6	2.4	2.5	4.4	4.4	2.3	2.3	5.6	5.4	3.1	2.8	9.7	9.6	5.5	5.5	2.2	2.2	3.4	3.4	4.5	4.6	4.6	4.7	9.5	9.4
4.9	4.9	2.2	2.4	4.3	4.6	2.5	2.4	5.3	5.4	3.0	3.1	10.0	10.0	5.5	5.7	2.5	2.5	3.2	3.3	4.4	4.5	4.7	4.5	9.5	9.8
4.5	4.7	2.3	2.5	4.0	—	2.1	—	4.8	4.9	2.4	2.5	8.2	8.2	5.2	5.3	2.3	2.3	3.0	3.1	4.4	4.5	4.8	4.7	8.5	8.5
5.3	—	—	2.5	4.3	4.4	2.4	2.4	5.2	5.2	3.2	3.1	9.0	8.9	5.5	5.6	2.5	2.5	3.1	3.2	4.0	4.2	4.2	4.2	8.2	7.8
5.9	5.8	2.3	2.2	4.3	4.1	2.7	2.8	5.3	5.3	3.5	3.6	9.8	9.6	5.8	5.7	2.8	2.8	3.6	3.6	4.3	4.3	4.8	4.9	8.9	9.3
4.7	4.7	—	1.8	3.8	3.9	2.2	2.1	5.0	5.1	2.5	2.5	8.7	8.8	5.0	5.0	2.3	2.4	2.8	2.7	3.8	3.8	3.6	3.7	7.8	7.8
4.7	4.7	1.9	1.8	3.7	3.7	2.2	2.2	4.6	4.7	2.7	2.7	8.3	8.4	4.8	4.9	2.2	2.3	2.8	3.0	3.9	4.0	4.0	4.1	7.8	7.8
4.7	4.7	2.4	2.4	4.2	4.3	2.3	2.3	4.8	5.0	2.5	2.5	8.3	8.3	5.1	5.0	2.3	2.3	2.9	2.9	3.8	3.7	3.9	3.7	7.7	7.7
5.0	5.1	2.2	—	3.8	—	2.5	—	5.0	5.0	2.7	2.7	8.4	8.3	5.7	5.7	2.6	2.5	3.1	3.1	3.9	3.8	3.6	3.6	8.0	8.0
4.9	5.0	2.1	—	3.7	3.7	2.1	2.1	4.8	4.8	2.5	2.6	9.0	8.8	5.3	5.2	2.4	2.3	3.1	3.0	3.8	3.9	3.8	3.8	7.6	7.7
5.3	5.5	—	2.1	—	—	—	—	—	—	—	—	—	—	—	—	2.5	2.6	2.8	2.9	4.2	4.1	4.4	4.4	8.6	8.6
5.3	5.5	2.4	2.3	4.2	4.2	2.5	2.5	5.4	5.5	3.6	3.6	9.7	9.6	6.1	6.2	2.6	2.6	3.3	3.3	4.4	4.6	5.3	5.3	9.8	9.9
4.7	4.8	—	—	4.0	4.1	2.4	2.4	5.3	5.4	3.4	3.4	9.4	9.4	5.7	5.7	2.5	2.5	3.1	3.1	4.4	4.5	4.8	4.7	9.1	9.1

colour than the specimen from Bari, the head hindquarters and limbs being dark brown; a blackish-brown median streak on the hindquarters; tail blackish-brown to almost black. The female skin from Szechwan is paler than that of the male, although it is very similar. The yellowish colour of the shoulders fades to buffy posteriorly. In this paler colour it approaches the mounted skins, which certainly are somewhat bleached. Taking into account the descriptions of skins of typical *flavigula* by Pocock (1936 b) the Chinese skins come within the range of variation, and I agree with Pocock (1936 b, p. 533) and Allen (1938, p. 363) who refer specimens from southern China to the typical subspecies. As I have no specimens from Siberia or Manchuria for comparison I cannot make out whether this northern form (*Martes (Charronia) flavigula borealis* Radde =

aterrima Pallas) is a distinct subspecies. Neither do I know whether Thomas (1927, p. 49; Allen, 1938, p. 365) was correct in relegating the subspecies *indochinensis* Kloss to the synonymy of *flavigula* *flavigula*. Pocock (1936b, p. 543) recognizes *indochinensis* as a valid form.

Under *Mustela flavigula*, Jentink (1892, p. 140) mentions two specimens that certainly do not belong to this species. Both are mounted specimens from the Hodgson collection. The larger (specimen "a") is labelled Nepal, the smaller (specimen "b") is labelled Tibet. They differ so much from those labelled *Mustela hardwickii* that it is evident that they are not conspecific with these. In coloration specimen "a" resembles *Martes (Martes) martes* (L.), while specimen "b" agrees in this respect with *Martes (Martes) foina* (Schreb.). The much damaged skulls were extracted, and these show similar differences. Specimen "a" has the upper third premolar (P^3) with a concave outer border and with a strongly convex inner border as figured for *martes* by Miller (1912a, fig. 80a); in specimen "b" both the outer and the inner border of P^3 are about straight, in this respect approaching the slightly biconvex teeth of *foina* (Miller, l.c., fig. 80b). Besides these differences in the shape of P^3 , Miller (l.c., p. 366) mentions that the length of the inner lobe of P^4 is about equal to the width of the trenchant part of that tooth in *martes*, but barely half that width in *foina*; the breadth of the upper molar (M^1) is about equal to the length of P^4 in *martes*, while in *foina* it is noticeably less than this length. To check whether these characters were of use to class the two specimens from the Hodgson collection I calculated indices from them (Indices I, III). Moreover I calculated indices from some other measurements of P^4 and M^1 (Indices II, IV—VI).

Index I:	$\frac{\text{Length of inner lobe of } P^4 \times 100}{\text{Width of trenchant part of } P^4}$
Index II:	$\frac{\text{Length of inner lobe of } P^4 \times 100}{\text{Length of } P^4}$
Index III:	$\frac{\text{Breadth of } M^1 \times 100}{\text{Length of } P^4}$
Index IV:	$\frac{\text{Lateral length of } M^1 \times 100}{\text{Mesial length of } M^1}$
Index V:	$\frac{\text{Mesial length of } M^1 \times 100}{\text{Breadth of } M^1}$
Index VI:	$\frac{\text{Breadth of } P^4 \text{ (across inner lobe)} \times 100}{\text{Length of } P^4}$

These indices were calculated for five specimens of *Martes (Martes)*

TABLE 2. Measurements in mm

	sex	P ⁴		P ⁴ length of inner lobe		P ⁴ width of trenchant part		M ¹		M ¹		M ¹		P ⁴ breadth across inner lobe	
		r	l	r	l	r	l	r	l	r	l	r	l	r	l
<i>Martes (Martes) martes martes</i>															
reg. no. 628 . . .	♂	8.5	8.5	2.6	2.6	3.1	3.0	8.4	8.0	5.0	5.1	6.8	6.8	5.4	5.4
reg. no. 787 . . .	♂	8.7	8.6	2.5	2.5	3.1	3.2	8.9	8.9	4.8	4.8	6.5	6.5	5.8	5.7
cat. ost.: a . . .	♂	8.6	8.6	2.6	2.6	2.8	2.8	8.5	8.5	4.8	4.8	6.8	6.9	5.9	5.7
reg. no. 638 . . .	♀	7.9	7.8	2.3	2.2	3.1	3.1	7.7	7.7	4.4	4.3	5.9	5.8	5.3	5.3
reg. no. 845 . . .	♀	7.6	7.6	2.4	2.4	2.8	2.8	7.9	7.9	4.0	4.0	5.2	5.2	4.9	4.9
Nepal, specimen a . . .	—	9.1	9.1	2.5	2.5	3.4	3.5	8.4	8.5	4.3	4.4	6.4	6.5	6.7	6.7
Tibet, specimen b . . .	—	8.6	8.6	1.8	1.8	2.8	2.7	7.6	7.7	4.0	4.1	4.8	4.8	4.5	4.4
<i>Martes (Martes) foina foina</i>															
reg. no. 769 . . .	♂	9.6	9.6	2.2	2.1	3.6	3.7	8.9	8.9	5.3	5.1	—	—	5.8	5.8
reg. no. 941 . . .	♂	9.5	9.6	2.0	2.0	3.5	3.5	8.4	8.4	4.9	4.9	5.5	5.5	5.5	5.5
reg. no. 750 . . .	♂	9.8	9.6	1.9	1.9	3.4	3.4	8.6	8.6	5.0	5.0	5.7	5.7	5.6	5.4
reg. no. 1047 . . .	♂	9.8	9.7	2.0	2.0	3.4	3.5	8.5	8.4	4.7	4.7	5.7	5.9	5.3	5.4
reg. no. 951 . . .	♂	8.9	8.9	1.9	1.9	3.3	3.4	8.0	8.0	4.5	4.4	5.0	5.0	5.4	5.0
reg. no. 743 . . .	♂	9.5	9.5	2.0	2.0	3.5	3.6	8.4	8.4	4.8	4.8	5.8	5.8	5.8	5.7
reg. no. 1147 . . .	♀	8.7	8.7	2.1	2.2	4.3	4.3	8.2	7.9	4.6	4.5	5.5	5.6	5.0	5.2
reg. no. 983 . . .	♀	8.9	8.9	1.9	2.0	3.3	3.3	8.0	7.9	4.9	4.8	5.4	5.2	5.0	5.0
reg. no. 844 . . .	♀	8.2	8.2	1.8	1.8	3.0	3.0	7.8	7.8	4.6	4.6	4.7	4.7	4.8	4.8
reg. no. 1068 . . .	♀	8.9	8.9	—	1.9	3.3	3.3	7.8	7.8	4.6	—	4.9	5.0	—	5.0
<i>Martes (Martes) zibellina</i>															
cat. ost.: a . . .	—	8.9	8.9	2.5	2.5	3.4	3.4	8.5	8.4	4.4	4.4	6.9	6.8	5.7	5.7
cat. ost.: b . . .	—	8.2	8.2	2.4	2.4	3.1	3.0	8.0	7.9	4.3	4.4	5.6	5.5	5.5	5.6

martes martes (L.), for ten specimens of *Martes (Martes) foina foina* (Schreb.) (all from the Netherlands), for the two specimens from the Hodgson collection, for two skulls labelled *Mustela zibellina* from Siberia, and for the specimens of *Martes (Charronia) flavigula* (Bodd.). The actual measurements are given in tables 1 and 2; the indices are given in tables 3 and 4, while in table 5 the range of variation of these indices is given. As the number of specimens examined is small it is not impossible that the range of variation may prove to be greater than is supposed at present. From table 5 it is clear that with regard of the differences men-

TABLE 3. Indices

	Sex	Index I		Index II		Index III		Index IV		Index V		Index VI	
		r	l	r	l	r	l	r	l	r	l	r	l
<i>Martes (Charronia) flavigula</i>													
<i>flavigula</i>													
cat. ost.: b	♂	73.7	71.8	26.9	26.7	93.3	92.4	97.9	100.0	49.5	48.5	64.4	64.8
cat. ost.: a	—	64.7	64.7	22.7	22.9	97.9	97.9	97.8	97.9	48.4	50.0	56.7	57.3
Mus. Amsterdam	—	78.1	75.8	25.0	25.0	95.0	98.0	93.6	100.0	49.5	45.9	55.0	57.0
cat. ost.: c	—	76.7	74.2	28.0	28.0	103.7	103.7	91.7	95.7	56.5	55.3	63.4	64.6
<i>Martes (Charronia) flavigula</i>													
<i>lasiotis</i>													
Sumatra, Padang	♂	80.6	78.1	27.8	25.8	91.1	87.6	95.2	100.0	51.2	53.8	61.1	62.7
Sumatra, Mt. Talamau .	♂	77.8	77.8	28.6	29.2	90.8	96.9	89.6	87.8	53.9	52.7	59.2	59.4
Sumatra, leg. Westenenk	—	82.1	88.8	26.4	27.3	89.7	88.6	105.6	102.7	46.2	47.4	57.5	56.8
Sumatra, Sody-collection	♀	78.6	76.7	26.5	27.4	94.0	92.9	97.5	97.6	51.3	52.6	57.8	58.3
Banka, Sody-collection .	—	79.3	79.3	27.7	27.7	92.8	92.8	97.4	100.0	50.6	48.1	61.0	60.2
Borneo, leg. Diard . . .	—	83.9	80.6	31.0	30.1	95.2	96.4	108.3	105.6	45.0	45.0	67.9	68.7
Borneo, Pleyharie . . .	♂	77.4	76.7	26.7	26.1	84.4	87.5	100.0	102.6	47.4	49.9	58.9	59.1
Borneo, leg. Hose . . .	—	89.3	89.7	—	—	—	—	95.5	93.2	51.2	51.2	—	—
Java, leg. Müller	♀	78.8	78.8	26.8	27.1	101.0	103.1	83.0	86.8	54.1	53.5	62.9	64.6
Java, leg. Büttikofer. . .	♀	80.6	80.6	26.6	26.6	96.8	96.8	91.7	95.8	52.7	51.6	60.6	60.6

TABLE 4. Indices

	Sex	Index I		Index II		Index III		Index IV		Index V		Index VI	
		r	l	r	l	r	l	r	l	r	l	r	l
<i>Martes (Martes) martes</i>													
<i>martes</i>													
reg. no. 628	♂	83.9	86.7	30.6	30.6	98.8	94.1	73.5	75.0	81.0	85.0	63.5	63.5
reg. no. 787	♂	80.6	78.1	28.7	29.1	102.3	103.5	73.8	73.8	73.0	73.0	66.7	66.3
cat. ost.: a	♂	92.9	92.9	30.2	30.2	98.8	98.8	70.6	69.6	80.0	81.2	68.6	66.3
reg. no. 638	♀	74.2	71.0	30.3	28.2	97.5	98.7	74.6	74.1	76.6	75.3	67.1	67.9
reg. no. 845	♀	85.7	85.7	31.6	31.6	103.9	103.9	76.9	76.9	65.8	65.8	64.5	64.5
Nepal, specimen a . . .	—	73.5	71.4	27.5	27.5	92.3	93.4	67.2	67.7	76.2	76.4	73.6	73.6
Tibet, specimen b . . .	—	64.3	66.7	20.9	20.9	88.4	89.5	83.3	85.4	63.2	62.4	52.3	51.2
<i>Martes (Martes) foina foina</i>													
<i>foina</i>													
reg. no. 769	♂	57.1	57.1	22.9	21.9	92.7	92.7	—	—	—	—	60.4	60.4
reg. no. 941	♂	57.1	57.1	21.1	20.8	88.4	87.5	87.3	87.3	65.5	65.5	57.9	57.3
reg. no. 750	♂	55.9	55.9	19.4	19.8	87.8	89.6	87.7	87.7	66.3	66.3	57.1	56.3
reg. no. 1047	♂	58.8	57.1	20.4	20.6	86.7	86.6	82.5	79.7	67.1	70.2	54.1	55.7
reg. no. 951	♂	57.6	55.9	21.3	21.3	89.8	89.8	90.0	88.0	62.5	62.5	60.7	56.2
reg. no. 743	♂	57.1	55.6	21.1	21.1	88.4	88.4	82.8	82.8	69.0	69.0	61.1	60.0
reg. no. 1147	♀	48.8	51.2	24.1	25.3	94.3	90.8	83.6	80.4	67.1	70.9	—	—
reg. no. 983	♀	57.6	60.6	21.5	22.5	89.9	88.8	90.7	92.3	67.5	65.8	56.2	56.2
reg. no. 844	♀	60.0	60.0	22.0	22.0	95.1	95.1	97.9	97.9	60.3	60.3	58.5	58.5
reg. no. 1068	♀	—	57.6	—	21.3	87.6	87.6	93.9	—	62.8	64.1	—	56.2
<i>Martes (Martes) zibellina</i>													
<i>zibellina</i>													
cat. ost.: a	—	73.5	73.5	28.1	28.1	94.4	95.5	67.2	67.7	81.2	81.0	64.0	64.0
cat. ost.: b	—	77.4	80.0	29.2	29.2	98.8	96.3	76.7	80.0	70.0	69.6	67.1	68.3

TABLE 5. Range of variation of the indices

		Index I	Index II	Index III	Index IV	Index V	Index VI
<i>Martes (Martes) martes martes</i>	5	71.0—92.9	28.2—31.6	94.1—103.9	69.6—76.9	65.8—85.0	63.5—68.6
Nepal, specimen a	1	71.4—73.5	27.5	92.3—93.4	67.2—67.7	76.2—76.4	73.6
Tibet, specimen b	1	64.3—66.7	20.9	88.4—89.5	83.3—85.4	62.4—63.2	51.2—52.3
<i>Martes (Martes) foina foina</i>	10	48.8—60.6	19.4—25.3	86.6—95.1	79.7—97.7	60.3—70.9	54.1—61.1
<i>Martes (Martes) zibellina</i>	2	73.5—80.0	28.1—29.2	94.4—98.8	67.2—80.0	69.6—81.2	64.0—68.3
<i>Martes (Charronia) flavigula</i>	14	64.7—89.7	22.7—31.0	84.4—103.7	83.0—108.3	45.0—56.5	55.0—68.7
<i>Martes (Charronia) flavigula flavigula</i>	4	64.7—78.1	22.7—28.0	92.4—103.7	91.7—100.0	45.9—56.5	55.0—64.8
<i>Martes (Charronia) flavigula lasiotis</i>	10	76.7—89.7	25.8—31.0	84.4—103.1	83.0—108.3	45.0—54.1	56.8—68.7
Sumatra	4	76.7—88.8	25.8—29.2	87.6—96.9	87.8—105.6	46.2—53.9	56.8—62.7
Banka	1	79.3	27.7	92.8	97.4—100.0	48.1—50.6	60.2—61.4
Borneo	3	76.7—89.7	26.1—31.0	84.4—96.4	93.2—108.3	45.0—51.2	58.9—68.7
Java	2	78.8—80.6	26.6—27.1	96.8—103.1	83.0—95.8	51.6—54.1	60.6—64.6

tioned by Miller a distinct difference between *martes* and *foina* exists in the values for index I, while the difference is not clearly marked in index III, where the ranges of variation overlap. In the cases of indices II, IV and VI small differences were found, while the ranges of variation for index V overlap.

With regard to these indices, specimen "a" appears to agree better with *martes* than with *foina*; indices I, V, VI come within the range of variation of *martes*; IV differs slightly from *martes*, but much more from *foina*; II is more or less intermediate, but somewhat nearer to *martes*; III comes within the range of variation of *foina*, but it is also very close to the values for *martes*, as the ranges of variation of the two species overlap. From *flavigula* specimen "a" differs in the values for indices IV, V, VI; it comes very close to the *zibellina* skulls, but differs from these in the shape of P³, which in the latter is of the *foina* type.

Specimen "b" agrees better with *foina*; indices II, III, IV and V come within the range of variation of *foina*; I is intermediate between *martes* and *foina*, while in VI it remains below the minimum for *foina*, and much below that for *martes*. In indices II and V it differs from *flavigula*, and in all indices it differs from the *zibellina* skulls.

As the material examined is very small it may prove that the differences between *martes* and *foina* are still smaller than those mentioned here. Another difficulty was that the specimens of *martes* and *foina* are all

from the western part of the range of the species, as it is not impossible that specimens from more eastern localities may show differences from the western specimens.

Martes (Martes) foina has been recorded from the regions where Hodgson procured his collections. Cheesman (1917, p. 335) gives the range as including the Himalayas; Blanford (1893, p. 449) mentions *Mustela foina*, var., as occurring on the Tibetan plateau. In recent literature these specimens are apparently referred to a distinct species, *Martes toufaeus*, which was described by Hodgson in 1842 (Journ. As. Soc. Beng., vol. 11, p. 281). Indeed specimen "b" has this name (although incorrectly spelled) written on the board on which it is mounted. Whether *Martes toufaeus* Hodgson represents a distinct species or that it is a subspecies of *foina* I cannot tell, but I believe that the specimen examined by me may be safely referred to *Martes (Martes) foina* (Schreb.). In old publications (e.g., Horsfield, 1851, p. 101: *Martes abietum*) *Martes (Martes) martes* has been recorded from these regions, but in most cases this is due to the fact that these authors did not separate *foina* from *martes*. I do not know of any trustworthy record of this species from the Himalayas or Tibet. It has been recorded from eastern Turkestan by Severtzoff (1876, p. 45), who describes specimens intermediate between *martes* and *foina* (*Mustela intermedia* Sev.). Unhappily Ognev's book on the Mammals of northern Asia was not available to me, so that I cannot check the exact distribution of *martes* in Asia. For the present I can only say that specimen "b" of Jentink's catalogue appears to be a *Martes (Martes) martes* (L.), leaving it to further researches to show whether the species actually occurs in the region.

Martes (Charronia) flavigula lasiotis (Gray)

Mustela hardwickii, Müller, Zoogd. Ind. Arch., Verh. Nat. Gesch. Ned. Overz. Bez., Zool., 1839, pp. 30 and 3rd page of table (part.; J, S¹).
M[ustela] hardwickii, Mohnike, Blicke Pflanz. Thierl. Niederl. Malaienl., 1883, p. 414 (J, S).
M[artes] hardwickii, Hamilton Smith, Introd. Mamm., Naturalist's Libr., vol. 15, 1858, p. 187 (part.; East Indies).
Mustela flavigula Var. 1 *Mustela hardwickei*, Grevé, Nova Acta Ac. Leop. Carol., vol. 63, 1894, pp. 180, 214, pl. XVII (part.; J, S, B).
M[ustela] [(Martes)] flavigula, Wagner, in: Schreber, Säugeth., Suppl. vol. 2 1841, p. 224 (part.; J, S); Giebel, Säugeth., 1855, p. 774 (part.; J, S), and 2nd ed., 1859, p. 774 (part.; J, S).
Must[ela] [(Martes)] flavigula, Schinz, Synops. Mamm., vol. 1, 1844, p. 335 (part.; J, S).

¹) The islands from which the species is recorded are indicated by the abbreviations J = Java, S = Sumatra, B = Borneo.

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Lamprogale flavigula henrici, Pocock, Proc. Zool. Soc. Lond., 1936, pp. 548, 552 (S).

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Mustela henrici var. *leucotis*, Trouessart, Cat. Mamm., vol. 1, pts. 1—3, 1897, p. 272, (J, S, B).

Mustela *h[enrici] leucotis*, Ménégaux, Mammif., vol. 1, n.d., p. 471 (B).

Martes henricii leucotis, Raven, Bull. Am. Mus. Nat. Hist., vol. 68, 1935, p. 258 (J, S, B).

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Lamprogale flavigula saba, Pocock, Proc. Zool. Soc. Lond., 1936, pp. 549, 552, fig. 2B (B).

[*Lamprogale flavigula*] *saba*, Sody, Temminckia, vol. 2, 1937, p. 243 (North Borneo).

Lamprogale flavigula robinsoni Pocock, Ann. Mag. Nat. Hist., ser. 10, vol. 17, 1936, p. 403 (J); Pocock, Proc. Zool. Soc. Lond., 1936, pp. 549, 552 (J).

Specimens examined:

1 ex., ♂, Padang, W. Sumatra, leg. Henrici; mounted skin (cat. syst.: a) skull (cat. ost.: b); type of *Mustela (Martes) henricii* Westerman.

1 ex., ♀, Padang, W. Sumatra, leg. S. Müller; mounted skin (cat. syst.: b), skull (cat. ost.: c); type of *Mustela lasiotis* (Temm. M. S.) Gray.

1 ex., ♂, semiad., Priaman, W. Sumatra, leg. F. von Faber, 1883; mounted skin (cat. syst.: c) with skull inside.

1 ex., ♂, Mt. Talamau, Ophir District, W. Sumatra, 1300 m, 3.V.1917, leg. E. Jacobson, collector's nr. 325; skin and skull.

1 ex., ?, W. Sumatra, leg. Westenenk, from Prof. Dr. Eug. Dubois' collection, skull.

1 ex., ♀, Lampung Districts, S. Sumatra, collection of Mr. H. J. V. Sody, skin and skull.

1 ex., ♀, S. Sumatra (probably Tandjong Karang), leg. Miss F. Heubel, Zoölogisch Museum, Amsterdam; skin and skull; this specimen lived for some time in the Zoological Gardens in Amsterdam; its skull shows the deficiencies usual in Zoo specimens, and consequently it has not been measured.

1 ex., Banka collection Mr. H. J. V. Sody, nr. B. K. 80; skin of head and skull.

1 ex., ♂, Pleyharie, S. E. Borneo, leg. Dr. Semmelink, 20.VIII.1866; mounted skin (cat. syst.: e), skull (cat. ost.: e).

1 ex., semiad., British Borneo, leg. Ch. Hose; skin and skull.

1 ex., Borneo, leg. Diard, skeleton (cat. ost.: a).

1 ex., ♀, Mt. Gedeh, W. Java, leg. S. Müller; mounted skin (cat. syst.: f), skull (cat. ost.: d).

1 ex., ♀, Mt. Gedeh, W. Java, leg. Dr. J. Büttikofer, XI.1893; skin and skull.

As shown in an earlier paper (Brongersma, 1940; Dammerman, 1940, p. 268) the specimen from Bencoolen considered by Jentink (1892, p. 140: specimen d) to be a very young specimen of *Mustela henrici*, in fact is an adult *Mustela lutreolina* Rob. & Thos.

Pocock (1936 b) in his revision of *Lamprogale flavigula* (= *Martes (Charronia) flavigula*) enumerates three subspecies from the Malay Archipelago, viz., *Lamprogale flavigula henricii* (Westerman) from Sumatra, *Lamprogale flavigula saba* (Chasen & Kloss) from Borneo, and *Lamprogale flavigula robinsoni* Pocock from Java. Starting from this point of view I tried to group the specimens at hand in three sets corresponding with the subspecies mentioned, but in vain. The individual variation proved to be rather large, and at least for the present time I believe it safer to recognize only one subspecies for this region. The descriptions given by Bonhote (1901), Pocock (1936 b) and those given by other authors of Sumatran specimens (Lyon, 1908, p. 660; Robinson & Kloss, 1919, p. 304), and of specimens from Borneo (Lyon, 1911, p. 119; Chasen & Kloss, 1932, p. 13) show that the coloration is subject to considerable variation. This pertains especially to the colour of the throat. In the male from Padang the throat is ochraceous orange; in the male from Mt. Talamau it is much lighter, between warm buff and antimony yellow, like that of the semiadult male from Priaman. The male from Pleyharie, S.E. Borneo, has the throat ochraceous buff. In the females the throat appears to be lighter in colour; the female collected on Mt. Gedeh by Müller has the throat between light and warm buff, while in the female collected by Büttikofer in the same locality the throat is almost white. The female from S. Sumatra in the Amsterdam Museum has the throat cream buff; that in the Sody collection has

TABLE 6. Range of variation of measurements in mm

	condylo-basal length	C—M ¹	P ² length	P ³ length	P ⁴ length	P ⁴ breadth	M ¹ breadth
<i>Martes (Charronia) flavigula flavigula</i> . . .	94.3—102.7	28.8—33.4	4.0—4.6	4.8—6.3	8.2—10.5	5.2—6.8	8.5—9.8
<i>Martes (Charronia) flavigula lasiotis</i> , total . .	83.9—97.9	26.5—31.9	3.7—4.4	4.6—5.5	8.3—9.8	4.8—6.2	7.6—9.9
Sumatra + Banka .	83.9—94.4	26.9—29.6	3.7—4.4	4.6—5.3	8.3—9.8	4.8—5.8	7.7—9.3
Borneo	87.2—91.0	26.5—28.4	3.7—3.8	4.8—5.0	8.3—9.0	5.2—5.7	7.6—8.6
Java	93.7—97.9	30.6—31.9	4.0—4.2	5.3—5.5	9.4—9.7	5.7—6.2	9.1—9.9

it between cream buff and cartridge buff. I do not find that the line of demarcation between the white and brown on the lower cheek is less distinctly marked in Javan specimens than in those from other localities as described by Pocock (1936 b, p. 549). All specimens agree in that the shoulders are lighter than the posterior part of the back, but even in this there is considerable variation. The hindquarters are of a very dark brown colour to almost black. The tail and feet are blackish brown to black. Like the Javan female described by Pocock (1936 b, p. 549) the two Javan females examined by me have a pair of whitish inguinal patches. I did not find similar patches in specimens from other islands.

In separating the three subspecies mentioned, Pocock and other authors make use of the differences in size as expressed by the condylo-basal length. It is possible that slight differences may be found to exist between the average measurements of the specimens from the different islands, but as yet I do not attach much importance to these differences, as individual variation is very great (table 6). Pocock gives the condylo-basal length for four adult males from Sumatra as varying from 87½ to 97 mm. With regard to the skull measurements (tables 1, 6, 7, 8) the scanty material available to me does not give an indication to the existence of more than one subspecies in the Archipelago.

Some differences were found in the skulls, but these all proved to be individual variations. Thus the position of the posterior palatine foramina varies from just behind the level of the inner lobe of P⁴ to just in front of it (fig. 1 a—c). Moreover small differences may exist between the position of the right and left foramen. In most specimens the antorbital foramen reaches to above or behind the anterior root of P⁴ (fig. 1 e, g), but in the Javan specimen collected by Müller, the foramen is situated just in front of the anterior root of P⁴ (fig. 1 i). In the latter specimen the

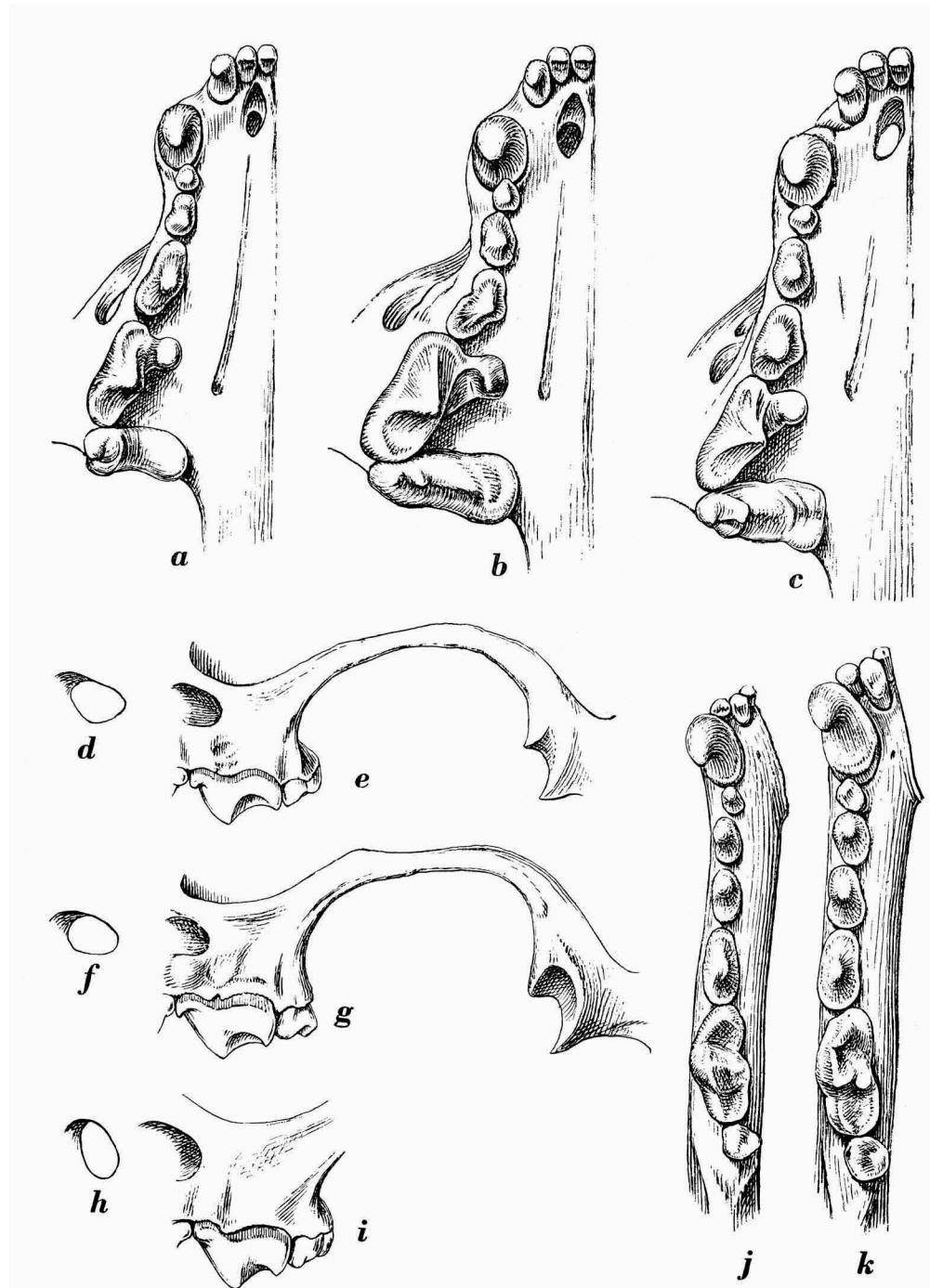


Fig. 1. a-k, *Martes (Charronia) flavigula lasiotis* (Gray); a, right maxilla and palate of the ♂ from Padang, lower view; b, id. of the ♂ from Mt. Talamau; c, id. of the ♀ from Mt. Gedeh, leg. Müller; d, f, h, outlines of the antorbital foramen in the same three specimens; e, part of the left maxilla and zygomatic arch, showing the position of the antorbital foramen, ♂ from Padang; g, id. of the ♂ from Mt. Talamau; i, part of the left maxilla, showing the position of the antorbital foramen, ♀ from Mt. Gedeh, leg. Müller; j, left lower jaw of the specimen collected by Westenenk, upper view; k, id. of the ♂ from Mt. Talamau.
 a-c, $\times 1\frac{7}{8}$; d-k, $\times 1\frac{1}{2}$.

TABLE 7. Measurements in mm

	sex	length of lower jaw	height of lower jaw in front of M_1	width of lower jaw in front of M_1	C— M_2		$P_2—M_1$		C		P_1	
					r	l	r	l	r	l	r	l
<i>Martes (Charronia) flavigula flavigula</i>												
Cat. ost.: b	♂	65.0	10.5	4.9	38.8	39.7	27.3	28.4	—	6.6	2.6	2.6
Cat. ost.: a	—	63.3	9.7	5.0	38.8	38.4	26.3	26.6	6.4	6.3	2.6	2.5
Mus. Amsterdam	—	58.1	9.2	4.7	37.2	37.1	25.8	24.7	6.5	6.6	2.6	2.4
Cat. ost.: c	—	56.6	7.7	4.4	34.6	34.3	24.1	24.4	4.9	5.1	2.3	—
<i>Martes (Charronia) flavigula lasiotis</i>												
Sumatra, Padang	♂	58.3	10.0	4.8	35.4	34.8	23.7	23.7	6.7	6.0	—	—
Sumatra, Mt. Talamau	♂	58.6	8.4	4.6	35.3	35.5	24.3	24.2	5.7	5.7	2.8	2.6
Sumatra, leg. Westenenk	—	53.7	8.6	4.2	33.3	33.5	22.8	22.9	5.5	5.5	—	2.1
Sumatra, Lampong distr.	♂	—	—	—	31.9	31.9	21.7	21.5	5.6	5.5	2.1	2.2
Banka	—	54.7	8.8	4.1	—	—	22.7	22.6	—	5.8	2.3	2.3
Borneo, leg. Diard	—	54.8	9.3	4.6	33.7	33.7	22.8	—	5.6	5.7	—	—
Borneo, Pleyharie	♂	56.7	9.8	4.6	34.4	34.3	22.0	22.5	5.7	5.6	2.4	2.3
Borneo, leg. Hose.	—	51.0	—	—	32.0	32.1	22.7	22.8	5.6	5.7	—	—
Java, leg. Müller	♀	62.2	9.7	4.8	38.5	38.1	26.3	26.5	6.1	6.1	2.5	2.5
Java, leg. Büttikofer	♀	57.6	9.3	4.3	35.9	35.6	25.4	25.5	5.5	5.4	2.1	—
<i>Martes (Charronia) flavigula subspec.</i>												
Goea Djimbe, reg. no. 10037 a . . .	—	—	9.5	4.6	37.5	—	25.4	—	5.5	—	—	—
Goea Djimbe, reg. no. 10037 b . . .	—	57.6	9.5	4.5	—	—	—	25.2	—	—	—	—
Goea Djimbe, reg. no. 10037 c . . .	—	± 60.8	10.3	5.3	—	36.7	—	26.8	—	6.3	—	—

right foramen antorbitale is subdivided by a horizontal bar. The shape of the foramen is variable too; it generally is elliptical or more or less triangular in outline, its greatest diameter being placed more or less horizontally (fig. 1 d, f) or distinctly sloping downwards and outwards (fig. 1 h). The shape of the zygomatic arches shows slight differences; in some specimens the curve being more flattened (fig. 1 g) than in others (fig. 1 e).

The teeth of the specimens examined show little variation in shape. Some small differences are evident from fig. 1 a—c, j, k. In the male from Padang (fig. 1 a) P^3 has a slightly concave outer border, while in a female from Java this border is slightly convex; the skull collected by Westenenk has the P^3 with a clearly marked indenture on the outer side. In the

P ₂				P ₃				P ₄				M ₁								M ₂			
length	breadth	length	breadth	length	breadth	length	breadth	length	breadth	length	breadth	length of anterior blade	length of posterior blade	length	breadth	length	breadth	length	breadth				
r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l	r	l				
4.6	4.7	2.8	2.8	5.7	5.6	3.4	3.1	7.2	7.3	3.7	3.5	—	10.5	4.6	4.6	—	2.7	—	—				
4.5	4.6	2.4	2.5	4.9	5.1	2.8	2.7	6.4	6.4	3.3	3.1	10.4	10.5	4.4	4.5	2.6	2.7	4.0	3.8				
4.8	4.7	2.7	2.6	5.5	5.3	3.0	3.0	7.0	6.8	3.1	3.1	10.5	10.4	4.4	4.5	2.7	2.6	4.2	3.9				
3.7	3.7	2.4	2.3	4.6	4.5	2.6	2.6	5.6	5.6	2.8	2.9	9.2	9.3	3.8	4.1	2.3	2.3	3.2	3.8				
4.3	4.3	2.5	2.5	4.9	4.8	2.8	2.7	6.0	6.0	3.2	3.1	9.1	9.4	4.2	4.3	2.5	2.3	3.1	3.3				
4.4	4.4	2.8	2.9	5.0	5.0	3.2	3.1	6.4	6.4	3.5	3.4	9.8	9.7	4.4	4.5	2.5	2.4	3.5	3.4				
3.8	3.8	2.1	2.2	4.5	4.5	2.3	2.4	5.7	5.7	2.7	2.6	9.2	9.1	3.7	3.9	2.4	2.4	3.2	3.4				
4.0	4.1	2.4	2.4	4.6	4.6	2.6	2.6	5.6	5.7	3.0	3.0	8.5	8.6	3.8	3.9	2.2	2.2	3.3	2.7				
4.2	4.1	2.3	2.3	4.7	4.6	2.4	2.4	5.5	5.4	2.8	2.7	9.1	9.2	3.8	3.9	—	—	—	—				
3.9	—	2.5	2.5	4.7	4.6	2.7	2.6	5.6	5.6	2.8	2.9	9.2	9.4	4.2	4.3	—	—	3.1	3.4				
3.7	3.8	2.3	2.3	4.4	4.6	2.6	2.6	5.5	5.6	2.9	2.8	9.1	9.0	4.3	4.3	2.4	2.3	3.6	3.5				
4.1	4.2	2.4	2.4	—	—	—	—	—	—	—	—	8.9	9.0	4.2	4.2	2.1	2.0	3.2	3.2				
4.3	4.3	2.6	2.7	5.0	5.0	3.1	3.1	6.5	6.3	3.6	3.5	10.7	10.7	4.7	4.8	2.5	2.7	3.8	3.8				
4.4	4.4	2.5	2.6	4.9	4.9	2.9	2.8	6.1	6.1	3.2	3.3	9.8	9.9	4.3	4.4	2.4	2.3	3.5	3.4				
4.5	—	2.5	—	4.7	—	2.7	—	6.0	—	3.0	—	10.4	—	4.0	—	2.7	—	3.5	—				
—	4.3	—	2.5	—	4.7	—	2.7	—	6.1	—	3.2	—	10.5	—	4.2	—	2.6	—	3.5	—			
—	4.4	—	2.7	—	—	—	—	6.5	—	3.6	—	11.0	—	4.7	—	2.8	—	3.8	—				

female from Java (fig. 1 c) the inner border of P₃ is strongly convex, while in the male from Padang (fig. 1 a) this is only slightly so. The variation in size is shown in tables 1 and 6. From the measurements of the teeth some indices were calculated, comparable to those given for *Martes (Martes) martes* (L.) and *Martes (Martes) foina foina* (Schreb.) given in table 3. At first sight the variation in the indices seems to be very large, but it must be borne in mind, that with these very small measurements a difference in one of the measurements of 0.05 mm (the grade of exactness is 0.1 mm) may make a difference of more than 1 % in the index. However this may be, the indices do not show differences that might be explained by assuming that the specimens belong to more than one subspecies.

TABLE 8. Range of variation of measurements

	P ₂ —M ₁	P ₂		P ₃		P ₄		M ₁	
		length	breadth	length	breadth	length	breadth	length	breadth
<i>Martes (Charronia) flavigula flavigula</i> . . .	24.1—28.4	3.7—4.8	2.3—2.8	4.5—5.7	2.6—3.4	5.6—7.3	2.8—3.7	9.2—10.5	3.8—4.6
<i>Martes (Charronia) flavigula lasiotis</i> , total . . .	21.5—26.5	3.7—4.4	2.1—2.9	4.4—5.0	2.3—3.2	5.4—6.5	2.6—3.6	8.5—10.7	3.7—4.8
Sumatra + Banka . . .	21.5—24.3	3.8—4.4	2.1—2.9	4.5—5.0	2.3—3.2	5.4—6.4	2.6—3.5	8.5—9.7	3.7—4.5
Borneo	22.0—22.8	3.7—4.2	2.3—2.5	4.4—4.7	2.6—2.7	5.5—5.6	2.8—2.9	8.9—9.4	4.2—4.3
Java	25.4—26.5	4.3—4.4	2.5—2.7	4.9—5.0	2.8—3.1	6.1—6.5	3.2—3.6	9.8—10.7	4.3—4.8
<i>Martes (Charronia) flavigula</i> subsp.	25.2—26.8	4.3—4.5	2.5—2.7	4.7	2.7	6.0—6.5	3.0—3.6	10.4—11.0	4.0—4.7

Pocock (1936 b, p. 550) mentioned already that P₁ may be absent in *flavigula*. Among the specimens examined by me only the female collected on Mt. Gedeh by Müller lacks this tooth on both sides, no trace of an alveole being found. In the male from Padang, the specimen from Pleyharie, and in the Bornean specimen collected by Diard it is absent on the left side, but it seems that part of the root is still present. It is also absent on the left side in a female from Padang, which is still in toothchange. The female from British Borneo lacks P₁ on the right side; it is possible that it has been present, as there is a trace of an alveole, which is in open contact with the alveole of the canine.

Among the specimens examined a female from British Borneo and a female from Padang are still in toothchange. In the Bornean specimen the incisivi, the canine, P₂, P₄ and M₁ have already erupted; P₃ is just erupting; in the lower jaw the incisivi, the canine, P₂, M₁ and M₂ have erupted, P₃ is just erupting, p₄ is being shed. Measurements of p₄: length: right 6.6, left 6.6 mm, breadth: right 3.0, left 3.1 mm. In the Padang specimen I₁, I₂, I₁ and I₂ are in place, the right I₃ and both I₃ erupting; i₃ of the left side still present; on both sides p₂, p₃, p₄, p₃ and p₄, as well as c are present. On the left side M₁ is erupting. Measurements of p₃: length: right 7.1, left 7.1, breadth: 4.4, 5.0, length of inner lobe: 1.5, 1.6 mm; of p₄: lateral length: right 3.0, left 3.0, mesial length 1.6, 1.6, breadth: 4.8, 4.8 mm; of p₃: length: right 4.2, left 4.1, breadth: 2.0, 2.0 mm; of p₄: length: right 6.8, left 6.8, breadth 2.9, 3.0 mm.

Sody (1937, p. 243) states that specimens from South Borneo differ from

those from North Borneo (described as subspecies *saba* by Chasen & Kloss) by their greater measurements. Therefore, there are two possibilities, viz., Borneo is inhabited by two subspecies (one of which may be identical with the subspecies described from Sumatra), or the variation is larger than has been previously supposed, and there is no endemic subspecies in Borneo. This latter possibility seems to me to be more likely, at least so long as not a very extensive series becomes available. Neither the coloration, nor the measurements of the skull and teeth seem to justify the distinction of more than one subspecies in the Malay Archipelago. For the single subspecies recognized by me I have used the name *Martes (Charronia) flavigula lasiotis* (Gray). The use of this subspecific name needs some explanation.

For long years the subspecies from the Malay Archipelago has been known as *henricii* Westerman (cf. synonymy). This name appeared in print for the first time, when Gray included *M[ustela] Henrici* as a doubtful synonym of *Martes flavigula* (Gray, 1843, p. 64). As the author of this name Gray cites Boie. Apparently Boie did never publish the name, but going over his manuscript notes made in Java, I found one dated Buitenzorg, January 21st, 1827, in which the marten collected at Padang by Henrici (and now in the Leiden Museum) is described as *Mustela Henricii*. S. Müller, who had access to these notes struck out the name *henricii* and replaced it by *Hardwickii*, under which name he mentions the Malayan martens in 1839 (p. 30). However, no valid description of *M. henrici* was published, and as Gray (1843, p. 64) mentions it only as a doubtful synonym of *Martes flavigula* it was at that time still a nomen nudum. Schinz (1845, p. 36) described a *Must[ela] Henrici*, stated to have come from the Himalayas. The description is short, but it may well apply to *Martes (Charronia) flavigula flavigula* (Bodd.). The locality mentioned by Schinz also points to this subspecies, although I am well aware, that this indication cannot be considered as absolutely trustworthy, as the specimen belonged to the dealer Frank, who was not altogether to be relied upon in this respect. The description by Schinz makes the name *Mustela henrici* valid, and places it as a strict synonym of *Martes (Charronia) flavigula flavigula* (Bodd.). Still later, Westerman (1851, p. 13) described a *Mustela (Martes) Henricii* from Java, Sumatra and Borneo, figuring the specimen collected by Henrici. Pocock (1936 a, p. 403; 1936 b, p. 548) restricted *henricii* to specimens from Sumatra. As *henricii* Westerman, 1851, must be considered a homonym of *henrici* Schinz, 1845, the name cannot be applied to specimens from Sumatra.

Several other names have been used in connection with specimens from

the Malay Archipelago, viz., *hardwickii*, *leucotis* and *lasiotis*. *Mustela hardwickii* was proposed by Horsfield (1828, p. 239) for specimens from Nepal, and this name, nor the modified forms *hardwickei* or *hardwikii* as used by some authors can be applied to Malay specimens. In the synonymies for Malay specimens *Mustela* [(*Martes*)] *leucotis* (Temm. M. S.) Hamilton Smith has been cited, but besides that it is preoccupied by *Mustela leucotis* Bechstein, 1800, for Indian specimens, the species described by Hamilton Smith (in Griffith, 1827, p. 126; 1858, p. 188) is not the yellow-throated marten. Gray (1843, p. 64) mentions *M[ustela] lasiotis* as a doubtful synonym of *Martes flavigula*. As author of this species Gray mentions Temminck, but as in the case of *henrici* the name had not yet been published. In Gray's publication no description is given, and *Mustela lasiotis* Gray, 1843, must be considered a nomen nudum. Gray (1850, p. 17) definitely includes *M[ustela] lasiotis* in the synonymy of *Martes flavigula*, and this act makes the name valid. Obviously Gray was of the same opinion as Müller (1839, p. 30), viz., that the martens from the Malay Archipelago were specifically identic with those from British India. The range is given to include Java and Sumatra. Under these circumstances I believe it to be perfectly justified to restrict the name *lasiotis* to specimens from these islands, especially as Jentink (1892, p. 140: *Mustela henrici*, specimen b) has shown that the manuscript name was used by Temminck for a specimen from Padang collected by S. Müller. Should one not accept this solution, then it would be necessary to consider *lasiotis* a synonym of *flavigula flavigula*, either on the base of the reference given by Gray in 1850 (p. 17) or by that given in 1865 (Gray, p. 109). The consequence would be that the subspecies inhabiting Sumatra, Java and Borneo should be named *saba*, a name since 1932 in use for Bornean specimens only. This latter course would probably create considerable confusion in the future. Therefore, I have chosen *lasiotis* as the subspecific name as this name has hardly been used.

Besides from Java, Sumatra, Banka and Borneo this marten has been mentioned from several other islands. Grevé (1894, p. 180) includes Palawan, Great Natuna, Balabac, the Calamianes, Cuyo, Sulu, Sibutu, and the Paternoster Is. in the range for this species. Trouessart (1897, p. 272) mentions the same islands with the exception of Cuyo. Tjeenk Willink, (1905, pp. 220, 324) mentions the species from the Natuna Is. and from the Sulu Is., while Van Balen (1914, p. 331) only mentions the Sulu Is. Recently Raven (1935, p. 258) again mentioned Palawan, Balabac, Natuna Is., Sulu, Sebuku, and the Calamianes Is. All these references probably are taken from a paper by Everett (1893) who includes these islands in the

Bornean group, which he considered as a zoogeographical unit. *Mustela flavigula* is mentioned for this group by Everett (l.c., p. 495), but no indication is given that the species actually occurred on all these islands. In fact I am not aware that it ever has been recorded from any of these islands, except from Borneo itself. The species is not mentioned by Taylor (1934) in his book on the mammals from the Philippine Islands. Trustworthy records exist only for Java, Sumatra, Banka and Borneo.

***Martes (Charronia) flavigula* subsp. (Pl. IV figs. 5—8)**

Three incomplete lower jaws collected in the Djimbe cave, near Redjotongan, Kediri Residency, Central Java (leg. Dubois, reg. nos. 10037 a—c) must be referred to *Martes (Charronia) flavigula*.

10037 a. Right lower jaw (pl. IV figs. 7, 8), the processus coronoideus, the condylus and the processus angularis broken off. Of the teeth C, P₂, P₃, P₄, and M₁ are present as well as the alveoles for the incisivi, P₁ and M₂.

10037 b. Left lower jaw (pl. IV fig. 6), the processus coronoideus broken off. Of the teeth P₂, P₃, P₄, and M₁ are present as well as the alveoles for the incisivi, C, P₁ and M₂. The symphysial part of this jaw fits rather well to that of no. 10037 a, so that they probably belonged to the same specimen. Moreover the lower carnassial (M₁) is worn to the same extent.

10037 c. Left lower jaw (pl. IV fig. 5), the processus coronoideus broken off. Of the teeth the basal part of C is present, as well as the complete P₂, P₄, and M₁. The alveoles for I₃ and M₂ are present, while part of the alveole of I₂ is preserved. The alveoles for P₃ are filled up by the matrix, and, therefore, they are difficult to discern. There is no trace of an alveole for P₁.

These lower jaws were compared to those of recent specimens of *Martes (Charronia) flavigula*, and no differences of importance were found. The measurements are given in table 7, together with those of the recent specimens, while in table 8 the range of variation of some of these measurements is given. Although slight differences are present these do not seem of any importance, and the jaws agree very well with those of recent specimens from Java. From these measurements the following indices were calculated:

$$\text{Index VII: } \frac{\text{Breadth of } P_2 \times 100}{\text{Length of } P_2}$$

$$\text{Index VIII: } \frac{\text{Breadth of } P_3 \times 100}{\text{Length of } P_3}$$

Index IX:	$\frac{\text{Breadth of } P_4 \times 100}{\text{Length of } P_4}$
Index X:	$\frac{\text{Breadth of } M_1 \times 100}{\text{Length of } M_1}$
Index XI:	$\frac{\text{Length of anterior blade of } M_1 \times 100}{\text{Length of posterior blade of } M_1}$
Index XII:	$\frac{\text{Width of jaw in front of } M_1 \times 100}{\text{Height of jaw in front of } M_1}$

The values calculated for these indices are given in table 9, while in table 10 the range of variation for these indices is given. From this table 10 results that the specimens from the Djimbe cave agree well with *flavigula*. Some slight differences from the two recent specimens from Java are present, but these no doubt are due to the fact that the available material is too scanty.

In none of the specimens examined do the teeth show particular variations. In some the teeth stand somewhat closer together, so that a few teeth are placed more obliquely. In some specimens P_1 is absent; in the male from Padang the alveoles for this tooth have obliterated on both sides; in the specimen collected by Westenenk P_1 is present on the left side, while on the right side only a trace of an alveole is found. In the female from Mt. Gedeh (leg. Büttikofer) it is lacking on the left side, and no trace of an alveole is found. In the specimen from Borneo collected by Diard it is lacking on both sides, the alveoles being absent too. This is also the case in the specimen from British Borneo, and although this specimen is still in toothchange, the position of P_2 close to the canine makes it improbable that P_1 would have erupted. In all other specimens P_1 (or a distinct alveole) is present. M_1 has a distinct internal cusp, although this may be very much worn (e.g., in the specimen collected by Westenenk, fig. 1 j).

The fact that only lower jaws are available makes it impossible to definitely assign the specimens from the Djimbe cave to the subspecies *lasiotis*, although no differences of importance from this subspecies were found.

CANIDAE

Canis familiaris L. (Pl. IV figs. 1—4)

The following remains collected from deposits in the Goea låwå near Wadjak, Kediri Residency, Central Java, are referred to *Canis familiaris* L.:

TABLE 9. Indices

	Index VII		Index VIII		Index IX		Index X		Index XI		Index XII	
	r	l	r	l	r	l	r	l	r	l	r	l
<i>Martes (Charronia) flavigula</i>												
<i>flavigula</i>												
cat. ost.: b	60.9	59.6	59.6	55.4	51.4	47.9	—	43.8	—	—	46.7	
cat. ost.: a	53.3	54.3	57.1	52.9	51.6	48.4	42.3	42.9	65.0	71.1	51.5	
Mus. Amsterdam . . .	56.3	55.3	54.5	56.6	42.9	45.6	41.9	43.3	64.3	66.7	51.1	
cat. ost.: c	64.9	62.2	56.5	57.8	50.0	51.8	41.3	44.1	71.9	71.9	57.1	
<i>Martes (Charronia) flavigula</i>												
<i>lasiotis</i>												
Sumatra, Padang . . .	58.1	58.1	57.1	56.3	53.3	51.7	46.2	45.8	80.6	74.2	48.0	
Sumatra, Mt. Talamau .	63.6	65.9	64.0	62.0	54.7	53.1	44.9	46.4	71.4	68.6	54.8	
Sumatra, leg. Westenenk	55.3	57.9	51.1	53.3	47.4	45.6	40.2	42.9	75.0	75.0	48.8	
Sumatra, Lampung distr.	60.0	58.5	56.5	56.5	53.6	52.6	44.7	45.3	66.7	64.7	—	
Banka	54.8	56.1	51.1	52.2	50.9	50.0	41.8	42.4	—	—	46.6	
Borneo, leg. Diard . . .	64.1	—	57.5	56.5	50.0	51.8	45.7	45.7	—	—	49.5	
Borneo, Pleyharie . . .	62.2	60.5	59.1	56.5	52.7	50.0	47.3	47.8	66.7	65.7	46.9	
Borneo, leg. Hose. . . .	58.5	57.1	—	—	—	—	47.2	46.7	65.6	62.5	—	
Java, leg. Müller . . .	60.5	62.8	62.0	62.0	55.4	55.6	43.9	44.9	65.8	71.1	49.5	
Java, leg. Büttikofer . .	56.8	59.1	59.2	57.1	52.5	54.1	43.9	44.4	68.6	67.6	46.2	
<i>Martes (Charronia) flavigula</i>												
subspec.												
Goea Djimbe, reg. no. 10037a	55.6	—	57.4	—	50.0	—	38.5	—	77.1	—	48.4	
Goea Djimbe, reg. no. 10037b	—	58.1	—	57.4	—	52.5	—	40.0	—	74.3	47.4	
Goea Djimbe, reg. no. 10037c	—	61.4	—	—	—	55.4	—	42.7	—	73.7	51.5	

TABLE 10. Range of variation of indices

	Index VII	Index VIII	Index IX	Index X	Index XI	Index XII
<i>Martes (Charronia) flavigula flavigula</i> . . .	53.3—64.9	52.9—59.6	42.9—51.8	41.3—44.1	64.3—71.9	46.7—57.1
<i>Martes (Charronia) flavigula flavigula</i> , total.	54.8—65.9	51.1—64.0	45.6—55.6	40.2—47.8	62.5—80.6	46.2—54.8
Sumatra + Banka .	54.8—65.9	51.1—64.0	45.6—53.6	40.2—46.4	64.7—80.6	46.6—54.8
Borneo.	57.1—64.1	56.5—59.1	50.0—52.7	46.7—47.8	62.5—66.7	46.9—49.5
Java	56.8—62.8	57.1—62.0	52.5—55.6	43.9—44.9	65.8—71.1	46.2—49.5
<i>Martes (Charronia) flavigula</i> subspec.	55.6—61.4	57.4	50.0—55.4	38.5—42.7	73.7—77.1	47.4—51.5

reg. no. 10049 a. Fragment of the right maxilla with P_3 , P_4 , M_1 and M_2 .

reg. no. 10049 b. Fragment of the left maxilla with P_3 , P_4 , M_1 and M_2 (pl. IV figs. 1, 2).

reg. no. 10049 c. Right lower jaw, the processus angularis and part of the condylus broken off (pl. IV fig. 4). Of the teeth C , P_3 , P_4 , M_1 and M_2 are present, as well as the alveoles for the incisivi, for P_1 , P_2 and M_3 . The roots of P_4 are broken, and it was only after the plate had been printed, that it was found that a loose P_4 fitted exactly in the alveole. The alveole of P_1 is large, while that for P_2 has almost completely obliterated, so that only a trace of it can be found.

reg. no. 10049 d. Symphysial part of the left lower jaw with C and P_3 as well as the alveoles for the incisivi and P_1 . No trace of an alveole for P_2 could be found. A similar complete absence of P_2 (on both sides) was found in a Chinese domestic dog (Chow, reg. no. 2242).

reg. no. 10049 e. Left P_4 .

reg. no. 10049 f. Left M_1 (pl. IV fig. 3).

reg. no. 10049 g. Left M_2 .

reg. no. 10049 h. Fragment of the processus coronoideus of the left lower jaw.

reg. no. 10049 i. Left upper canine.

Probably all these remains belonged to one animal. That they should be referred to the genus *Canis* and not to *Cuon* (the wild dog occurring in Java) was clear from the presence of an alveole for M_3 , which tooth is absent in *Cuon*.

For comparison to these remains I used the following specimens:

Pariah dog, sex ?, exact locality unknown, but probably Java, leg. Prof. Dr. Eug. Dubois; skull and lower jaw.

Pariah dog, ♂, Batavia, Java, XII. 1932, leg. Jhr. W. C. van Heurn, reg. no. 4066: skull and lower jaw.

Pariah dog, sex ?, Maros, Celebes, 1888, leg. Prof. Dr. Max Weber, Zoölogisch Museum, Amsterdam; skull only.

Pariah dog, sex ?, Sumatra, leg. Reinwardt (Jentink, 1887, p. 75, specimen o); skull and lower jaw.

Two Tengger dogs, ♂ ♂, Tengger Mts., E. Java, leg. Dr. J. H. F. Kohlbrugge; cat. nos.: ww, xx; skulls and lower jaws.

Two Chows, ♀ ♀, China, purchased from Blazer Bros., reg. nos. 2242, 2244; skulls and lower jaws.

Canis dingo Meyer, 2 ex., Australia (Jentink, 1887, p. 76, specimens: ss, tt), skulls and lower jaws.

Canis dingo Meyer, sex ?, Mt. Eba, S. Australia, leg. Prof. Wood Jones, Brit. Mus. (N.H.) reg. no. 25.10.8.36; skull and lower jaw.

Canis dingo Meyer, ♂, Olive R., Temple Bay, New Zealand, leg. G. Wilkins Brit.

TABLE II. Measurements in mm

	condylobasal length	C—M ²		P ³ —M ²		C		P ³		P ⁴		M ¹		M ²							
		r	r	r	1	1	r	1	r	1	r	1	r	1	r						
<i>Canis familiaris</i>																					
Goea lawa ²	—	—	38.7	39.0	8.4	16.7	+	9.8	10.2	4.2	4.3	16.4	17.1	11.3	15.1	14.9	6.0	5.7	8.4	8.3	
pariah, leg. Dubois	153.0	70.4	—	—	8.5	16.3	—	—	—	—	—	17.0	16.9	12.2	12.0	15.3	15.0	6.9	6.0	8.9	8.9
pariah, leg. Van Heurn, Java	140.7	64.8	38.8	39.3	8.3	16.3	9.5	9.6	4.0	4.1	15.7	15.5	10.6	10.6	13.6	13.6	5.9	5.9	8.1	8.1	
pariah, leg. Weber, Celebes	147.6	67.4	38.2	38.5	8.4	16.7	9.3	9.3	3.5	3.5	16.7	16.5	10.8	11.0	14.2	14.3	5.8	5.9	8.0	8.0	
pariah, leg. Reinwardt, Sumatra	169.1	75.8	42.6	42.6	10.4	21.9	11.3	11.4	4.6	4.8	18.8	18.7	11.8	11.6	16.8	16.8	7.3	7.2	10.4	10.4	
Tengger dog, leg. Kohlbrugge, cat. ost.: ww	192	87.9	48.2	48.3	11.7	21.7	12.0	12.0	5.2	5.0	18.3	18.3	12.2	12.2	16.8	16.5	7.1	7.2	10.8	10.9	
Tengger dog, leg. Kohlbrugge, cat. ost.: xx	183.1	1.79.2	47.0	46.5	11.1	—	12.4	12.2	5.1	5.3	18.7	18.6	12.5	12.6	16.6	16.5	7.4	7.3	10.6	10.5	
Chow, reg. no. 2242	156.2	70.2	40.1	40.5	9.7	21.5	11.2	11.4	5.5	5.5	17.7	17.8	11.6	11.6	16.8	16.9	6.5	6.3	9.8	9.8	
Chow, reg. no. 2244	164.8	73.1	42.9	42.1	9.9	19.4	11.7	11.6	6.9	6.3	18.2	18.1	11.7	11.8	16.8	16.9	6.5	6.4	11.2	11.2	
<i>Canis dingo</i>																					
cat. ost.: ss	—	81.0	45.4	45.0	—	—	12.0	12.2	4.7	4.8	19.0	19.0	13.0	12.9	17.0	16.7	7.4	10.8	10.6	—	
cat. ost.: tt	—	178.7	79.3	46.4	46.8	9.8	22.4	11.6	4.6	4.6	19.9	19.8	13.1	13.1	17.9	17.7	7.5	11.0	11.0	—	
Brit. Mus., reg. no. 2510.8.36	181.6	82.5	45.5	—	10.6	20.8	10.4	—	4.6	—	19.7	—	13.0	—	17.2	—	7.3	—	10.8	—	
Brit. Mus., reg. no. 23.12.16.9	180.7	80.9	44.0	—	9.6	20.1	+	—	—	—	18.4	—	12.2	—	15.3	—	6.5	—	8.6	—	
Brit. Mus., reg. no. 4.1.3.104	184.6	82.2	45.2	—	10.7	22.1	12.0	—	4.9	—	19.3	—	12.5	—	16.8	—	7.7	—	11.6	—	

TABLE I2. Measurements in mm

	Length of jaw	Length of lower M ₁	Height of jaw	Height below M ₁	C—M ₂	C	P ₃	P ₄	M ₁	M ₂	Height of C—M ₂				
											Java × 100				
											r	1	r	1	r
<i>Canis familiaris</i>															
Goea 18w ⁸	123+	23.3	74.9	9.1	9.4	16.7	16.8+	8.5	8.7	4.2	4.7	9.7	10.3	5.4	6.0
Pariah, leg. Dubois.	119.4	19.8	75.5	9.0	9.0	16.6	16.8	9.3	9.1	4.5	5.4	9.8	9.7	4.8	4.8
Pariah, leg. Van Heurn, Java	111.4	17.9	70.9	9.4	9.3	16.5	16.3	8.6	8.6	4.3	4.3	9.5	9.7	5.2	5.1
Pariah, leg. Weber, Cebelles.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pariah, leg. Reinwardt, Sumatra.	134.1	23.6	1.82.5	—	11.8	—	21.0	9.8	9.9	4.7	4.7	10.9	10.6	5.7	5.6
Tengger dog, leg. Kohl-brugge, cat. ost. ww.	151.5	25.6	93.5	11.3	11.2	20.0	19.8	9.9	—	4.7	—	11.1	11.1	5.7	5.8
Tengger dog, leg. Kohl-brugge, cat. ost. xx.	157.5	25.1	1.97.2	—	—	—	—	10.0	10.3	4.9	4.9	10.9	10.8	5.9	5.8
Chow, reg. no. 2242	124.8	21.1	76.0	11.0	11.0	17.5	17.6	9.7	9.9	5.0	5.2	11.0	11.5	6.1	6.3
Chow, reg. no. 2244	130.5	20.9	81.4	10.4	10.4	18.9	18.6	10.0	10.1	5.4	5.4	12.6	12.5	6.5	6.5
<i>Canis dingo</i>															
cat. ost. ss	143.8	22.7	88.1	11.4	11.4	20.5	20.4+	10.4	10.1	5.0	5.0	12.0	12.0	5.9	5.8
cat. ost. tt	139.2	23.8	85.4	10.9	10.8	21.3+	21.7	10.4	—	4.6	—	12.4	12.2	6.7	6.6
Brit. Mus., reg. no. 25.10.8.36	141.4	—	—	10.2	—	20.6	—	10.5	—	5.2	—	12.3	—	6.5	—
Brit. Mus., reg. no. 23.12.16.9	140.0	—	—	10.0	—	20.5	—	9.0	—	—	—	—	—	9.1	—
Brit. Mus., reg. no. 4.1.3.10.4	143.3	—	—	10.5	—	—	—	10.1	—	5.3	—	12.4	—	6.2	—

Mus. (N.H.) reg. no. 23.12.16.9; skull and lower jaw.
Canis dingo Meyer, sex ?, Arnhem Land, N. Territory, Australia, leg. J. T. Tunney, don. Hon. W. Rothschild, Brit. Mus. (N.H.) reg. no. 41.3.104; skull and lower jaw.

During a short visit to the Naturhistorische Museum in Bern, I compared the remains from Goea lâwâ to the interesting series of skulls of pariah dogs and of Battak dogs described by Studer (1890, 1897, 1901). The dogs from the Tengger Mts. were described by Kohlbrugge (1896, p. 283) under the name *Canis familiaris* var. *tenggerana*; the skull of one of these specimens has been figured by Jentink (1897, pl. 4).

The pariah dogs appear to be rather variable in size. The specimen collected in Sumatra by Reinwardt is larger than the other pariahs examined by me, and it surpasses the Battak dogs of which measurements have been published by Studer (1890). In this Sumatran pariah the right lower canine is absent, and no alveole was found; its place is marked by a slight roughening of the surface of the mandible.

In its measurements, the dog from Goea lâwâ agrees well with the pariahs collected by Dubois, Van Heurn and Weber, as well as with the Battak dogs measured by Studer (1890). The jaw appears to be slightly higher, however. Its height below M_1 as expressed in % of the length of $C-M_2$ is 31.1, while in the pariahs collected by Dubois and Van Heurn the height of the jaw is 26.2 and 25.2 % respectively. Also the processus coronoideus slopes slightly more backwards. The Tengger dogs are much larger, while the Chows are slightly larger than the Goea lâwâ dog. Mivart (1890, pp. 159—160) published measurements of some dingoes, which appear to be distinctly larger than those of the Goea lâwâ dog, but some of the teeth measurements of dingoes taken by me approach those of the Javan dog. The material used for comparison is so small that it is not possible to draw definite conclusions as to the race to which this domestic dog must be referred. It does not seem to differ in any important characters from the pariah dogs at present living in the Archipelago.

The measurements of the Goea lâwâ dog, together with those of the dogs used for comparison, are given in tables 11 and 12.

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EXPLANATION OF PLATE IV

Figs. 1—4, *Canis familiaris* L., Goea låwå, Java.
Fig. 1, left maxilla, reg. no. 10049 b, outer view.
Fig. 2, id., lower view.
Fig. 3, left M_1 , reg. no. 10049 f, upper view.
Fig. 4, right lower jaw, reg. no. 10049 c, outer view.
Figs. 5—8, *Martes (Charronia) flavigula* subsp., Goea Djimbe, Java.
Fig. 5, left lower jaw, reg. no. 10037 c, outer view.
Fig. 6, left lower jaw, reg. no. 10037 b, outer view.
Fig. 7, right lower jaw, reg. no. 10037 a, outer view.
Fig. 8, id., upper view.
Figs. 1, 2, 4, 5—7, slightly over natural size; figs. 3, 8, about 2 X.

